CLAIMS

1. A method for producing an aldehyde or ketone compound by using a microreactor, comprising a step (1) of mixing a liquid containing a sulfoxide compound with a liquid containing an activating agent for the sulfoxide compound to allow them to react to each other and to produce an activation reaction product of the sulfoxide compound; a step (2) of mixing the liquid containing the activation reaction product of the sulfoxide compound with a liquid containing at least one member selected from primary and secondary alkyl alcohols to allow them to react to each other and to prepare a liquid containing an alkoxysulfonium salt; and a step (3) of mixing the resulting liquid containing an alkoxysulfonium salt with a basic compound-containing liquid to allow them to react with each other and to prepare a liquid containing an aldehyde or ketone compound corresponding to the alkyl alcohol, wherein at least one step of steps (1), (2) and (3) is carried out by using a microreactor.

2. The method according to claim 1, wherein the microreactor comprises two liquid-introducing channels having a fine cross-sectional profile for introducing two type of liquids; one micromixer portion for mixing and reacting two kinds of liquids introduced, with each other having a fine cross-sectional profile and connected to the liquid introducing channel; and one liquid discharging channel for discharging a reaction product liquid from the micromixer portion, having a fine cross-sectional profile.

3. The method according to claim 2, wherein two steps connected to each other are carried out by using a microreactor and a liquid discharging channel of a rector of an upstream step and a liquid introducing channel of a reactor of a downstream step connected to the upstream step, are connected with each other through a connecting capillary tube.

4. The method according to claim 1 or 2, wherein

the steps (1) and (2) are carried out in the microreactor.

5. The method according to any one of claims 2 to 4, wherein the temperature of the liquids in the micromixer portion and the liquid discharging channel of the microreactor is adjusted to a desired value.

6. The method according to claim 3, wherein the temperature of the liquids in the connecting capillary tube is adjusted to a desired value.

7. The method according to any one of claims 2 to 6, wherein the cross-sectional area of the liquid introducing channel, that of the liquid micromixer portion and that of the liquid discharging channel in the microreactor, are respectively 0.7 μm^2 to 1 mm^2, 0.7 μm^2 to 1 mm^2 and 0.7 μm^2 to 1 mm^2.

8. The method according to any one of claims 2 to 7, wherein a major diameter/minor diameter ratio of the cross section of the liquid introducing channel, the liquid micromixer portion and the liquid discharging channel in the microreactor, is 1 or more and the minor diameter is within a range from 1 μm to 1 mm.

9. The method according to any one of claims 1 to 8, wherein, in the microreactor, the flow rate of the liquid to be discharged from the liquid micromixer is adjusted so that two kinds of liquids mixed with each other can be reacted to each other in the microreactor with a desired mixing efficiency and a desired retention time.

10. The method according to any one of claims 1 to 9, wherein the residence time of the liquid in the microreactor is adjusted to within a range from 0.001 to 60 seconds.

11. The method according to claim 2, wherein the step (1) is carried out using a microreactor and the residence time of a mixed reaction solution of the sulfoxide compound-containing liquid with an activating

agent-containing liquid in a portion of the microreactor between the inlet of the micromixer portion and the inlet of the reactor for the step (2) is in the range of from 0.001 to 60 seconds.

12. The method according to any one of claims 1 to 11, wherein the step (1) is carried out in the microreactor and the reaction temperature in the step (1) is in the range of from -80 to +50°C.

13. The method according to any one of claims 1 to 11, wherein the step (2) is carried out in the microreactor and the mixing reaction temperature in the step (2) is in the range of from -80 to +50°C.

14. The method according to any one of claims 1 to 13, wherein the sulfoxide compound is selected from a dialkyl sulfoxide.

15. The method according to claim 14, wherein dimethyl sulfoxide is used as the dialkyl sulfoxide.

16. The method according to any one of claims 1 to 13, wherein the activating agent for a sulfoxide compound is selected from acetic anhydride, oxalyl chloride, trifluoroacetic anhydride, trifluoromethanesulfonic anhydride, diphosphorus pentaoxide, chlorine, benzoyl chloride, acetyl chloride, methanesulfonyl chloride, p-toluenesulfonyl chloride, sulfur trioxide-pyridine complex and 2,4,6-trichloro-1,3,5-triazine.

17. The method according to any one of claims 1 to 16, wherein the primary and secondary alcohols are selected from saturated and unsaturated C_1-C_{20} aliphatic primary and secondary alcohols, or saturated and unsaturated aliphatic primary and secondary alcohols having an alicyclic aromatic hydrocarbon group, and saturated and unsaturated primary and secondary alcohols having a heterocyclic group.

18. The method according to any one of claims 1 to 17, wherein the basic compound is selected from organic amine compounds.

19. The method according to claim 18, wherein the

organic amine compound is selected from trialkylamines.

20. The method according to any one of claims 1 to 19, wherein a molar ratio of the sulfoxide compound to be supplied to the first step to the primary or secondary alcohol to be supplied to the second step is within a range of from 1:1 to 20:1.

21. The method according to any one of claims 1 to 20, wherein a molar ratio of the activating agent for a sulfoxide compound to be supplied to the first step to the primary or secondary alcohol to be supplied to the second step is within a range of from 1:1 to 2:1.

22. The method according to any one of claims 1 to 21, wherein a molar amount of the base compound to be supplied to the third step is 2 to 20 times the molar amount of the primary or secondary alcohol to be supplied to the second step.

23. The method according to any one of claims 1 to 22, further comprising a step of isolating the target aldehyde or ketone compound from the aldehyde or ketone compound-containing liquid prepared in the step (3).